

WHAT IS CLAIMED IS:

1. A projection exposure method, comprising: dividing a predetermined pattern into a plurality of mask patterns, and exposing images of said plurality of mask patterns onto a substrate while stitching screens through a projection optical system, thereby transferring an entire image of said predetermined pattern onto said substrate, wherein
when said predetermined pattern is divided into said plurality of mask patterns, boundary portions of adjacent two mask patterns are respectively provided with overlapping portions of superposed portions,
when an image of each mask pattern of said plurality mask patterns is exposed onto said substrate through said projection optical system,
said mask pattern and said substrate are moved in synchronously with a predetermined visual field of said projection optical system such that the pattern of said mask pattern other than said overlapping portion does not come out from said predetermined visual field and a pattern of said overlapping portion goes out from said visual field.
2. A projection exposure method, comprising: dividing a predetermined pattern into a plurality of mask patterns, and exposing images of said plurality of mask patterns onto a substrate while stitching screens through a projection optical system, thereby transferring an entire image of said predetermined pattern onto said substrate, wherein
said predetermined pattern is divided into said plurality of mask patterns along at least a predetermined direction, boundary portions of adjacent two mask patterns in said predetermined direction are provided with overlapping portions of superposed portions,
when an image of each mask pattern of said plurality of mask patterns is exposed onto said substrate through said projection optical system,

in a state in which an image of a pattern, of said mask pattern, in a visual field which is fixed to said projection optical system and is elongated in said predetermined direction is exposed onto said substrate through said projection optical system, said mask pattern and said substrate are scanned in synchronously with each other at the same speed ratio as a projection magnification of said projection optical system in a direction intersecting substantially at right angles with said predetermined direction with respect to said visual field, and

said mask pattern and said substrate are moved in synchronously with each other in said predetermined direction in accordance with exposure time and a width of said overlapping portion of said mask pattern with respect to said visual field.

3 . A projection exposure apparatus which exposes a pattern formed on a mask onto a substrate through a projection optical system, said projection optical system being an optical system which exposes an image of a pattern of said mask within a predetermined visual field onto said substrate, comprising:

a mask stage capable of holding said mask and moving in a predetermined direction,

a substrate stage capable of holding said substrate and moving two-dimensionally including said predetermined direction, and

a control system which drives said mask stage and said substrate stage to move said mask and said substrate in synchronous with each other in said predetermined direction such that, when an entire image of the pattern of said mask is exposed onto said substrate through said projection optical system, a portion of the pattern of said mask does not come out from said visual field and a pattern other than said portion goes out from said visual field.

4. A projection exposure apparatus which exposes a pattern formed on a mask onto a substrate through a projection optical system, said projection optical system being an optical system which exposes an image of the pattern of said mask in a visual field which is longer in a predetermined direction, comprising:

a mask stage capable of holding said mask and moving in said predetermined direction and in a direction intersecting substantially at right angles with said predetermined direction,

a substrate stage capable of holding said substrate and moving in a two-dimensional direction including said predetermined direction, and

a control system which, when an image of a pattern of said mask in said visual field is exposed onto said substrate through said projection optical system, drives said mask stage and said substrate stage to move said mask stage and said substrate stage in synchronous with each other in a direction intersecting said predetermined direction substantially at right angles and to move said mask and said substrate in said predetermined direction in synchronous with each other such that an end of said pattern of said mask goes out from said visual field by a predetermined width.

5. A producing method of a device comprising a step for transferring a device pattern onto a work piece using a projection exposure method as recited in claim 1.

6. A projection exposure method as recited in claim 1, wherein said visual field is a irradiation region of an energy beam, and an irradiation amount of said energy beam is gradually reduced, by said synchronous moving, in an exposure region of said overlapping portion on said substrate with respect to a predetermined direction along which said two mask patterns are arranged.

7. A projection exposure method, comprising the step of transferring a mask pattern is transferred to a plurality block regions arranged in a first direction on a substrate through a projection optical system to form a predetermined pattern on said substrate, peripheral portions of said block regions being partially overlapped, wherein in order to transfer said mask pattern to one block region of said plurality of block regions, said mask pattern and said substrate are moved in synchronous with each other with respect to a predetermined region where energy beam is irradiated within a visual field of said projection optical system, and moving directions of said mask pattern and said substrate are set to a direction which is intersecting with said first direction and with a second direction which intersects with said first direction at right angles such that an irradiating amount of said energy beam is gradually reduced at said peripheral portion in said one block region with respect to said first direction.

8. A projection exposure method as recited in claim 7, wherein in order to transfer a mask pattern to another block region adjacent to said one block region on said substrate with respect to said second direction, when said mask pattern is transferred to said one block region, an irradiation amount of said energy beam is gradually reduced with respect to said second direction at a peripheral portion in said one block region which partially overlap with said another block region.

9. A projection exposure method as recited in claim 8, wherein said predetermined region is rectangular in shape in which two sides of said predetermined region which are adjacent to each other respectively extend in said first and second directions in a visual field of said projection optical system, and a size of said predetermined region with respect to said first and second directions is smaller than that of said mask pattern.

10. A projection exposure method as recited in claim 7, wherein said mask pattern and said substrate are moved in synchronously with each other such that a portion of said mask pattern transferred to a region other than said peripheral portion within said block region does not go out from said predetermined region.